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The long trend of dust events in central Asia and their relationship to wind and precipitation during 1960-2015

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In this study we analyzed dust events records of surface meteorological stations on Xinjiang Basin during 1960–2015 and provided the spatial and temporal distribution of dust events. By using the dust index, the long-term trend and abrupt change of dust on this region are analyzed. And the main factors which influence the change of dust are also studied by using ground meteorological fields and NECP reanalysis data. The results show that more than 73% of dust events of the whole year occurred in spring and summer. The dust events which occurred in southern Xinjiang basin was significantly more than that in northern, and the high incidence area is distributed along the Taklamakan Desert. In the southern Xinjiang basin, where dust events mainly occurred, the dust index shows a significant downward trend during the past 56 years with a linear decreasing rate -8.2yr-1. At the same time, the surface wind speed also had a similar decline trend. Dust index is positively correlated to the surface winds, with correlation coefficients of 0.79. But after 2000, the increase of wind speed did not consistent with the increase of dust index and the correlation coefficient was reduced to 0.34. By analyzing the precipitation during this period, it is found that the total amount and frequency of precipitation increased by 21% and 13% respectively, which indicating that the increase of precipitation could inhibit the occurrence of dust. Additionally, the analysis of geopotential height and wind fields shows that the change of the intensity of the East Asian general circulation which dominates the upper-level wind fields in Xinjiang basin, will lead to changes in the near-surface wind speed and precipitation, thus affecting the trend of dust changes.